

EM375 MECHANICAL ENGINEERING EXPERIMENTATION

STRAIN GAGE LAB

There is no formal handout for this laboratory. This document is for background information only. Your instructor and the technicians will lead you through this laboratory / demonstration.

During this session you will learn to mount a strain gage. In order to verify that your gage is functional, you will test your gage.

Each person will mount their gage at a different place on separate metal bars. You will test your gage by clamping the bar to the edge of the desk, and then applying two different static loads to the end of the bar. This will put your bar in a combination of bending and shear.

If your bar overhangs the desk by a length L and the distance from the desk to the strain gage is x , the bending moment at the strain gage caused by end load P is given by:

$$M = P.(L - x)$$

Considering standard strength of materials methods for your uniform rectangular section bar, the bending stress at the section is given by:

$$s_x = e_x E = \frac{My}{I_y}$$

Rearranging for the strain, we get:

$$e_x = \frac{My}{EI_y} = \frac{P.(L - x).y}{EI_y}$$

Before leaving the lab class, you will complete the following table:

Distance x	Load	Calculated (theoretical) Strain	Measured Strain
	3 lbs		
	6 lbs		

All of the results for the entire group will be collated and plotted on a single graph of measured strain vs. theoretical strain. The group's success depends on getting a strain line curve fit with a slope of 1.00

Notes:

E for aluminum is 10.6×10^6 psi

$$I_y = \frac{bh^3}{12}$$